Interfacial Phenomena Near Phase Transitions, p. 1

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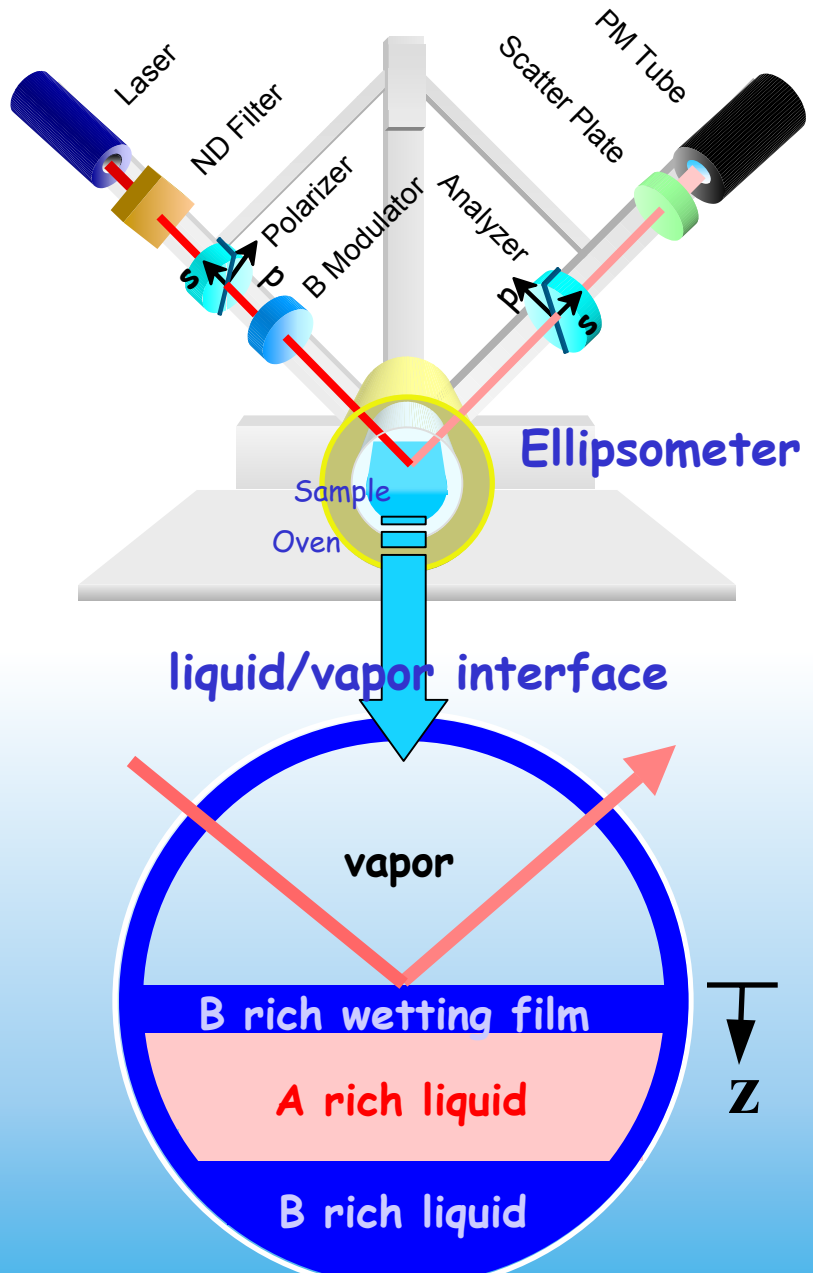
Liquid surface phenomena such as adsorption and wetting play an extremely important role in many physical, chemical, and biological processes. For example, adsorption and wetting affect the rates of chemical reactions in catalysis, the flocculation behavior of colloidal particles in solution, the motion of a liquid across a surface or through porous media and biological membranes, and the design of water repellant fabrics. Here we study the behavior of wetting films at the liquid/vapor surface of binary AB liquid mixtures on approaching the liquid-liquid miscibility transition, above which the two liquids are completely mixed.



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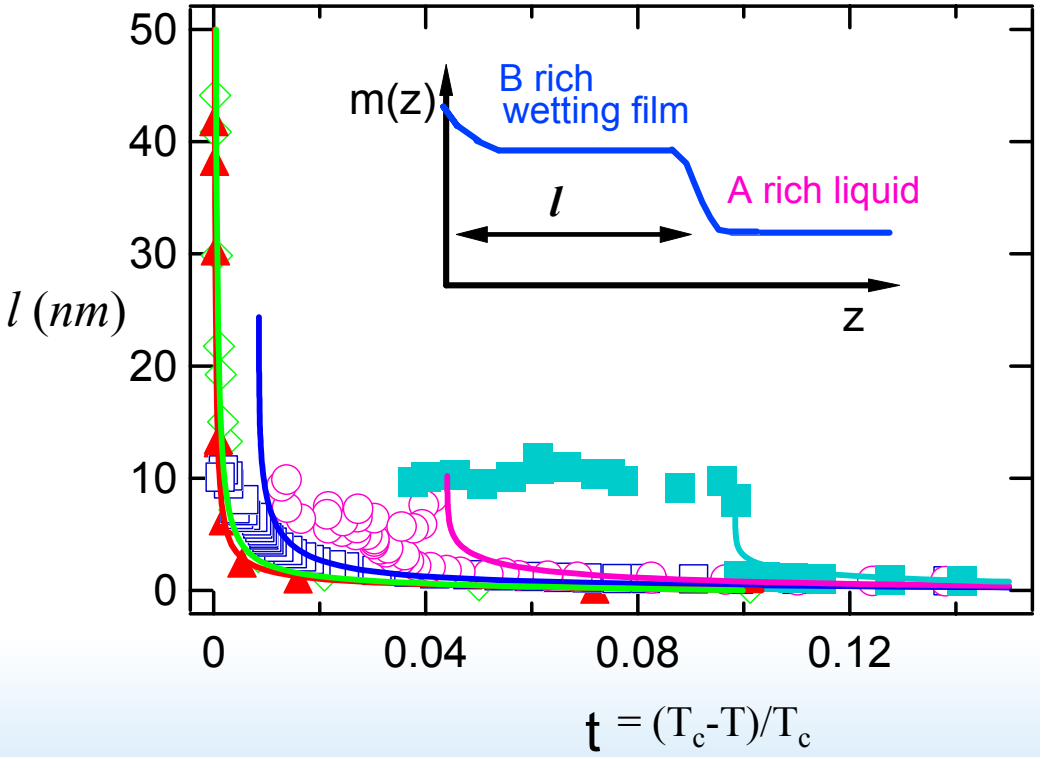
Educational:
Three undergraduates (including one Goldwater Scholar) and two graduates have been involved in research funded by this grant. One of these graduate students completed his PhD in 2002 and is currently employed as a postdoctoral research associate in my group.

The phase modulated ellipsometer used in this research is an excellent tool for explaining the fundamental concepts in optics. This instrument was used not only as a research instrument but also as a teaching tool in two upper level optics courses taught by the PI. These courses were taken by a dozen graduate and undergraduate students from the Physics, Chemistry, and Engineering Departments



The wetting layer film thickness l can exhibit either a discontinuous (solid squares) or continuous (solid triangles, open diamonds) wetting transition, depending upon the surface energy difference between components A and B, as the miscibility temperature T_c is approached. The solid lines are calculated from theory.